

Simplified Safety Diaphragm Regulator and Coal Economiser,' has been in use in the engine-room of the *Argus* for the last thirteen months, and has given great satisfaction. It consists of a convoluted iron tube, opening into the boiler, in which is a column of water, which, under pressure of steam, acts upon a lever, and damps the furnace fire when the pressure reaches the point beyond which it is not desired it should rise. By moving a weight the apparatus can be made to regulate the pressure to ten, twenty, thirty, or any other number of pounds that may be required. It effects a considerable economy of fuel, by obviating those frequent blowings off of steam which occur through ignorant or careless firing, and its use materially lessens the risk of accident through neglect or inexperience in engine-driver or stoker. The apparatus is inexpensive, and simple in its construction, costing only a few shillings per horse-power of boiler employed. It may be made by an ordinary blacksmith, and judging from our experience, costs very little to keep in repair, that in use on our own premises having cost nothing since it was fitted, more than a year since."

One erected at Mr. Buckley's flour mills, Sandhurst, proves equally effective.

And one at the Melbourne Orphanage, Emerald Hill, has been in use since 1867, and has, so far, maintained its reputation as being effective, and costing nothing to keep in repair.

ART. XL.—*Improved Fire-Plug.\** By A. K. SMITH, C.E.

[Read 13th May, 1872.]

It was found that in the City and suburbs, when the pressure was off from the Yan Yean water mains, the gutta-percha balls of the ordinary fire-plugs fell down, and that,

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\* This invention consists of introducing a spring A, beneath the ordinary gutta-percha, or other ball B, as shown in *figs. 1 and 2*, and which, by its elasticity forces the ball against the india-rubber washer C, closing the orifice against the admission of sewage, or other matter, liquid or solid, into the water mains when they are empty (from any reason), and thus preventing the contamination and waste of water when the mains are refilled.

CLAIM.—The manufacture and use of a coiled or other spring of iron, steel, brass or any other material, or elastic substance, or their mechanical equivalent, for securely closing the orifice of fire-plugs during the absence of internal pressure in the water-mains.

*Fig. 3* shows the brass cup and spindle as indicated in *figs. 1 and 2*.

as many of the fire-plugs were laid in and on a level with the street water-channels or gutters, sewage and other objectionable matters ran down into the empty pipes, and so contaminated the water used for drinking and domestic purposes. To remedy, or remove, the great danger of spreading disease by the use of such foul water, Mr. A. K. Smith's invention consists of applying a coiled or other spring of steel, brass, or other elastic substance, for effectually closing the orifice, at low levels, against the admission of sewage and other impurities during the absence of internal pressure. The author also suggested that in all lines of main where they were used, there should be at the highest level an ordinary air-valve, so that the air could escape when the pipes were filling with water; such air-valve or ordinary hydrant to be kept at a higher level, so that no fluid or solid matter could enter the orifice.

The Society learns with satisfaction that since Mr. Smith has called public attention to the danger arising from the contamination of the water in the street-mains by sewage entering at the fire-plugs, the Government has removed such fire-plugs from the bottom of the channels, to a position more distant, and higher, to obviate the danger pointed out.

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ART. XLI.—*Notes on Sirius and its Companion Stars.*  
(*Great Telescope.*) BY F. MACGEORGE, ESQ.

[Read 10th June, 1872.]

Mr. President and Gentlemen,—Last year was brought before you the fact that some minute stars had been observed in the optical vicinity of Sirius, and it has been thought that it may interest you to hear the detailed notes of these and subsequent observations of this star.

First will be read two notes of observation of Mr. Le Sueur, made while the mirror was not in so good working order as it is at present.

1869, Dec. 6th.—“Sirius very unsteady. Looked for Lassel's companion. Can see nothing at all. Do not know where companion is.

“*Spectrum*: *F*, *C*, and very fine lines too unsteady. *F* is very conspicuous, and remains clearly visible by the sky glare, when the star is removed from the slit.”